We claim:

1. A valve actuator for an internal combustion engine, comprising:

at least one electromagnet having a coil wound about a core;

an armature fixed to an armature shaft extending axially through the core, and axially movable relative thereto; and

at least one permanent magnet extending at least partially into an interior portion of the coil.

2. The actuator of claim 1 wherein the at least one permanent magnet is rectangular in shape.

3. The actuator of claim 1 wherein the at least one permanent magnet has a surface angled relative to axial movement of said shaft.

4. The actuator of claim 1 wherein the at least one permanent magnet has a cross-sectional V-shape.

5. The actuator of claim 1 wherein the at least one permanent magnet is substantially contained within said interior portion of the coil.

6. The actuator of claim 1 further comprising an air gap adjacent to said at least one permanent magnet.

7. The actuator of claim 6 wherein said core separates said coil from said air gap.

8. The actuator of claim 1 further comprising an air gap immediately adjacent to said at least one permanent magnet.

9. The actuator of claim 1 wherein the at least one permanent magnet is at least partially angled relative to axial movement of said shaft.

10. The actuator of claim 1 wherein the at least one permanent magnet has a cross-sectional shape with a peak on an opposite side from said armature, and two ends extending toward said armature at an angle.

11. A valve actuator for an internal combustion engine, comprising:

a core having a wound coil located therein, said core further having at least one permanent magnet located at least partially inside said coil and positioned at an angle relative to a direction of movement of an armature.

12. The valve actuator of claim 11 wherein said angle is between 5 and 85 degrees.

13. The valve actuator of claim 11 wherein said at least one permanent magnet extends substantially fully along a height of said coil.

14. The valve actuator of claim 11 wherein said at least one permanent magnet is substantially fully inside said coil.

15. The valve actuator of claim 11 further comprising at least an air gap adjacent to said at least one permanent magnet.

16. The valve actuator of claim 11 wherein said at least one permanent magnet includes multiple layers of permanent magnet material.

17. A system comprising:

a valve actuator comprising a pair of cores each having a wound coil located therein, each of said cores further having at least one permanent magnet located at least partially inside said respective coils and positioned at an angle relative to a direction of movement of an armature; and

a cylinder valve of an internal combustion engine coupled to said armature.

18. The system of claim 17 wherein said cylinder valve includes an intake valve.

19. The system of claim 18 further comprising a cam actuated exhaust valve of said internal combustion engine.

20. The system of claim 17 wherein said cylinder valve includes an exhaust valve.

21. A valve actuator for an internal combustion engine, comprising:

a core having a wound coil located therein, said core further having at least one permanent magnet located at least partially below said coil and positioned at an angle relative to a direction of movement of an armature, with an inner part of said permanent magnet being located closer to said coil than an outer part of said permanent magnet, where said inner part of said permanent magnet is closer to a center of said core than said outer part of said permanent magnet.

22. The valve actuator of claim 21 further comprising a first gap at said inner part of said permanent magnet and a second gap at said outer part of said permanent magnet.

23. The valve actuator of claim 22 wherein said permanent magnet is U-shaped.

24. A valve actuator for an internal combustion engine, comprising:

a core having a wound coil located therein;

permanent magnet means for increasing magnetic flux in the actuator; and

where said permanent magnet means is located at least partially within said coil and positioned at an angle relative to a direction of movement of an armature.